

REMARKS/ARGUMENTS

The Status of the Claims.

Claims 26 to 37, 40 to 42, 44, 45, 47, 48 and 60 to 63 are currently pending. Claims 1 to 25, 38, 39, 43, 46 and 49 to 59 were previously cancelled. No claims are amended herein.

Applicants submit that no new matter has been added to the application by way of this Response.

The Information Disclosure Statement.

Applicants note with appreciation the Examiner's thorough consideration of the references cited in the Information Disclosure Statement (Form 1449) submitted on March 30, 2009.

35 U.S.C. §103(a).

Claims 26 to 37, 40 to 42, 44, 45, 47, 48 and 60 to 63 were rejected under 35 U.S.C. §103(a) as allegedly obvious based on Bruchez (U.S. 6,274,323) variously in light of Mahamuni (J. Applied Physics, 85: 2861-2865), Cao (Angew. Chem. Int. Ed. 38 (24): 3692-3694 (1999)), Weiss (WO00/55631) and Bruchez (Science 281: 2013-2016 (1998)). To the extent the rejection is deemed applicable to the amended claims, Applicants traverse.

A proper analysis under the recently reaffirmed *Graham v John Deere* standard demonstrates the non-obviousness of the invention. According to the Supreme Court in *KSR International Co v. Teleflex* (550 U.S. 398 (2007); 127 S. Ct. 1727, 1740-41, 82 USPQ2d 1385-1396 (US 2007)), the appropriate standard for analyzing questions of obviousness is that:

the scope and content of the prior art are determined, differences between the prior art and the claims at issue are analyzed and the level of ordinary skill in the pertinent art is resolved. Against this background the obviousness or non-obviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unresolved needs, failure of others, etc. might be utilized to

give light to the circumstances surrounding the origin of the subject matter to be patented.

Id. quoting *Graham v. John Deere of Kansas City* 383 U.S. 1, 17-18.

The current Examination Guidelines (e.g., MPEP 2143) and *KSR* require the Office in an obviousness rejection to provide a statement as to why one of skill would have combined known elements. Further, an obviousness rejection must include fact-based findings demonstrating: 1) a combination of reference elements describing each limitation of the claims, 2) known elements that function in the same way in the combination as in the references themselves, 3) the elements are combined by known methods, 4) the result of the suggested combination of elements would have been predictable, and 5) one of skill in the art would have expected success in providing the claim in light of the references. Here, the rejection fails each of these requirements, as applied to the *Graham* factors. Further, *KSR* requires that the Office should "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does."

The present claim set includes a single independent claim 26:

A composition, comprising:

a population of nanocrystals characterized by an excitation spectrum and an emission spectrum, wherein the emission spectrum and at least a portion of the excitation spectrum are in the nonvisible range;

wherein the population of nanocrystals comprises a mixture of two or more subsets of nanocrystals, the subsets characterized by different excitation wavelengths, and

wherein the emissions of the population comprise different wavelengths or different wavelength intensities when alternately excited with the different excitation wavelengths. (Emphasis added.)

Not all limitations are taught by the references. The Office notes at page 4 of the Action that Bruchez discloses:

The use of semiconductor nanocrystals as detectable labels in various chemical and biological applications is disclosed. The methods find use for detecting a single analyte, as well as multiple analytes by using more than one semiconductor nanocrystal as a detectable label, each of which emits at a distinct wavelength. (Abstract.)

The logic of the rejection continues: "since Bruchez et al. teaches 'more than one semiconductor nanocrystal as a detectable label, each of which emits at a distinct wavelength,' Bruchez et al. teaches a plurality (i.e. mixture) of different nanocrystals." Emphasis added. However, this logic fails.

It is notable that teaching a "plurality" of nanocrystals does not actually teach a "mixture" of nanocrystals. This conclusory statement in the rejection is objectively not true. The mere existence of two or more nanocrystals does not teach a mixture. Therefore, this key argument for rejection fails. For example, two or more analytes can be detected by two or more nanocrystals at different locations (i.e., unmixed), and discrete separate detections are the teachings of Bruchez, as discussed below.

The prior art citations in the rejection always mention the separate nanocrystals have "distinct emission spectra". Webster's - distinct: discrete, separate. In contrast, the present claims are directed to "emissions of the [mixed] population of nanocrystals". The present Office Action fails to even allege a teaching of the emissions of a mixed population of nanocrystals, and therefore fails to state a case. In fact, the cited teaching of detecting multiple analytes by reading distinct emission spectra teaches away from detecting the combined emissions of a mixed nanocrystal population.

At the bottom of page 4, in the Action, it is acknowledged that "Bruchez et al. does not teach that emissions of the population comprise different wavelengths or different wavelengths intensities when alternately excited with different excitation wavelengths." This is said to be cured by the teaching of Mahamuni at Figures 5 and 6 where separate populations of 6.1 nm ZnO quantum dots (Figure 5) and 9.3 nm ZnO quantum dots (Figure 6) may have somewhat different emission spectra. The Office declares that "Figures 5 and 6, taken together, illustrates the alternating excitation of ZnO quantum dots using excitation wavelengths 300 nm and 325 nm, respectively." Applicants note that taken separately or taken together "alternating excitation of ZnO quantum dots using excitation wavelengths 300 nm and 325 nm" does not teach the required "emissions of the [mixed] population comprise different wavelengths or different wavelengths intensities when alternately excited with different excitation wavelengths", nor is this actually alleged in the Action. Therefore, again no case is made.

It is worth noting again, as in previous Responses, that the emissions of a mixed population of different nanocrystals is different from the separate distinct emissions of separate nanocrystals. For example, interference phenomenon between the combined emissions can add or subtract waveforms at different wavelengths resulting in unpredictable emissions outputs different those of separate spectra. The different emissions from one subpopulation can act as excitation wavelengths for another subpopulation, resulting in additional emissions different from separate emissions. Further, physical proximity of mixed populations can possibly lead to quantum energy exchanges, leading to additional different emissions. None of these phenomenon exist in the discrete emissions spectra of separate populations discussed in Bruchez or Mahamuni. These facts have been raised previously and remain unaddressed in by the Office.

Applicants note that, at page 10 of the present Action, the Office continues to argue that Bruchez at column 8, lines 45-50, teaches a mixture of different nanocrystals. Such a conclusion can not be reasonably found in the discussion of plural and singular in the specification wherein "the singular forms 'a,' 'an' and 'the' include plural references unless the content clearly dictates otherwise. Thus, for example, reference to 'a semiconductor nanocrystal' includes a mixture of two or more such semiconductor nanocrystals ..." This is clearly a note that "a nanocrystal" in the Bruchez specification can include the concept of two or more of the [same] nanocrystals. This is made even more clear in the context of the Bruchez specification wherein he desires to obtain discrete emission spectra.

The suggested combination does not use known elements that function in the same way in the combination as in the references themselves. The separate nanocrystals of Mahamuni are shown to function by providing particular distinct emission spectra in response to each of two excitation wavelengths. However, when the teachings are combined with Bruchez '323 as suggested, they would not function the same, and would not actually provide the invention, as claimed. Assuming it were known in cited art (and it is not) to mix nanocrystal populations to provide a unique composite emission, even then a mixture of the separate nanocrystals would not function in the same way in the mixture as they do separately, as discussed above. For example, the absorption and emissions output functions of the different nanocrystals would not be the same in a theoretical mixture as in separate

populations of Mahamuni. That is, the interactions between the mixed populations of different nanocrystals provide a different structure and function, resulting a different ultimate emission output compared to the separate nanocrystals taught in Mahamuni. The untaught mixture provides a different structure, with a different function and different result. According to MPEP 2143 the combination can not be considered obvious.

The result of the suggested combination would not be predictable. The combination of Bruchez '323 and Mahamuni would not be expected to succeed in providing the present claims, at least because not all limitations are taught. Further, one of skill could not predict the emissions output of a mixed population of different nanocrystal subsets, e.g., based on the separate pure population emissions. Applicants note that the statement reiterated at the top of page 12 in the action does not actually address the issue of combined nanocrystal population excitation and emission effects. That is, reiteration of comments about separate distinct emissions are not relevant to a discussion of emissions of mixed subpopulations of nanocrystals.

One of skill would not have been motivated to make the suggested combination.

Because not all limitations are taught, the references teach away from the present invention and there would not be an expectation of success, one of skill would not have been motivated to combine the art, as suggested in the rejection. For example, because Bruchez teaches distinct emission spectra to detect different analytes, one of skill would not be motivated to mix nanocrystals or desire to read emission spectra from mixed populations of nanocrystals.

Because not all limitations are taught, the suggested elements would function differently than in the reference, without an expectation of success, the claims can not be considered obvious based on the cited references. With regard to dependent claims, because they include all limitations of the parent, they can not be considered obvious. Further, as noted in past Responses with regard to claims 47 and 48, the animals can not be considered barriers because they are never described in Bruchez as in contact with any nanocrystal, but only as antibody sources. Applicants respectfully request withdrawal of the rejections.

Dependent claims are rejected at pages 12, 14 and 16 of the Action based on the addition of Cao, Weiss and Bruchez Science. However, the additional references do not provide teachings that would cure the failed rejections, e.g., of independent claim 26. Regarding these additional rejections of dependent claims, Applicants stand by their remarks of previous Responses. For example, none of Cao, Weiss or Bruchez Science teach the limitations of 1) a population of nanocrystals comprising a mixture of two or more subsets of nanocrystals, the subsets characterized by different excitation wavelengths, or 2) emissions of a mixed population of nanocrystals that comprise different wavelengths or different wavelength intensities when alternately excited with the different excitation wavelengths.

CONCLUSION

In view of the foregoing, Applicants believes all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the claims are deemed not to be in condition for allowance after consideration of this Response, a telephone interview with the Examiner is hereby requested. Please telephone the undersigned at (510) 769-3510 to schedule an interview.

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Respectfully submitted,



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Attachments:

- 1) A transmittal sheet; and,
- 2) A receipt indication postcard.